

CLAIMS

What is claimed is:

1. An article comprising:

a substrate including non-porous adherent protective coating on a portion of a surface of the substrate, the coating protects the substrate from corrosion by a fluid in contact with the coating, the coating includes a fluorine containing poly-oligomer that is chemically bonded to the substrate surface.

2. The article of claim 1 where the coating protects the substrate from corrosion above 25 °C.

3. The article of claim 1 including an adhesion promoter.

4. The article of claim 1 where the coating material includes fluorine containing poly-oligomers with alicyclic structures.

5. The article of claim 1 where the substrate further includes magnets, a sensing element, or a flow element.

6. The article of claim 1 where the substrate includes a rotatable shaft or a flexible member.

7. The article of claim 1 wherein the coating has a thickness of more than 50 microns.

8. An article comprising:

a housing having at least one fluid chamber, the chamber in fluid communication with a fluid inlet and a fluid outlet;

one or more structures interacting with a fluid in the chamber; and

one or more surfaces of the housing or the structures that interact with the fluid having an effective thickness of a non-porous fluorine containing poly-oligomer coating adherent on at least a portion of the surfaces.

9. The article of claim 8 where the structures interacting with the fluid in the chamber is a diaphragm, a bellows, an impeller, a sensor, or combinations of these.

10. The article of claim 8 where the housing, chamber, and structures interacting with the fluid form a pump, a valve, a fluid flow meter, or a fluid flow controller.
11. The article of claim 8 where the housing, chamber, and structures interacting with the fluid form a pump.
13. The article of claim 8 where the housing, chamber, and structures interacting with the fluid form a fluid flow controller.
14. The article of claim 8 where the housing, chamber, and structures interacting with the fluid form a fluid flow meter.
15. The article of claim 8 where the coating material includes fluorine containing poly-oligomers with alicyclic structures.
16. A article comprising:
 - a sensor with an effective thickness of a non-porous adherent coating on a surface of the sensor that contacts a fluid, the coating include a fluorine containing poly-oligomer that is chemically bonded to the sensor surface.
17. The article of claim 16 wherein the substrate includes structure for probing the sensor and structures for measuring the physical response of the sensor in contact with the fluid.
18. The article of claim 16 where the sensor substrate is a ceramic sensing material.
19. The article of claim 16 where the sensor is temperature sensor, a flow sensor, a chemical purity sensor, a pressure sensor, or a combination of these.
20. The article of claim 16 where the coating protects the substrate from corrosion above 25 °C.
21. A method comprising:
 - removing solvent from an amount of a bubble free coating material applied on a chemically bondable fluid contacting surface of a substrate to form a non-porous film, the coating material including a solvent and soluble fluorine containing poly-oligomers, the fluorine containing poly-oligomers have

reactive groups that chemically bond the poly-oligomer to the surface of the substrate.

22. The method of claim 21 where the non-porous film includes greater than 10% of the poly-oligomer in the coating material applied to the surface of the substrate.
23. The method of claim 21 further including the act of curing the non-porous film of the coating material on the chemically bondable fluid contacting surface of the substrate, the curing chemically bonds the reactive groups of the poly-oligomer to the chemically bondable surface of the substrate to form an adherent non-porous coating on the chemically bondable fluid contacting surface of the substrate.
24. The method of claim 21 wherein the chemically bondable fluid contacting surface of the substrate is a sensor, a conduit, a housing, an element of a pump or a combination of these.
25. The method of claim 23 where the curing occurs at a temperature less than the boiling point of the coating material solvent and less than the Tg of poly-oligomer.
26. The method of claim 23 further including the act of increasing the temperature of the film up to a value greater than the boiling point of the solvent and greater than the Tg of the poly-oligomer material.
27. The method of claim 21 wherein said chemically bondable fluid contacting surface of the sensor includes an organosilane that is capable of reacting with the fluorine containing poly-oligomer..
28. The method of claim 21 where the solvent removal occurs in an antistatic environment.
29. The method of claim 21 where the coating material includes an adhesion promoter.
30. The method of claim 21 wherein said adherent protective coating on the surface of the sensor has a thickness of greater than 50 microns and protects the substrate from corrosion.